Residential Energy Report Card for University Students for Driving Behavioral Energy Reduction and for Measuring Behavioral Impact on Consumption

Saroj Bhattarai

Advisor: Dr. Kevin Hallinan

Research Goals

The primary goals of this research are to utilize monthly residential energy grades with comparisons of energy consumption to other residents, along with energy education included on the monthly report cards and in energy reduction workshops, and competition to realize energy reduction in university students residing in stand-alone houses; subject to the constraint that the students did not have any financial incentive to reduce energy.

Statements of Problem

- ✓ Energy savings are achievable by improving the energy use behavior of people, because occupant activity in buildings account for nearly half of energy use
- ✓ Energy cost included in students monthly, fixed housing feed
- ✓ No economic incentives provided to reduce energy use
- ✓ Energy report card with energy usage feedback, grading and ranking in the student neighborhood is possible due to unique nature of housing with separate gas and electric meter
- ✓ Energy use feedback could affect students energy consumption through their personal behaviors

Methodology

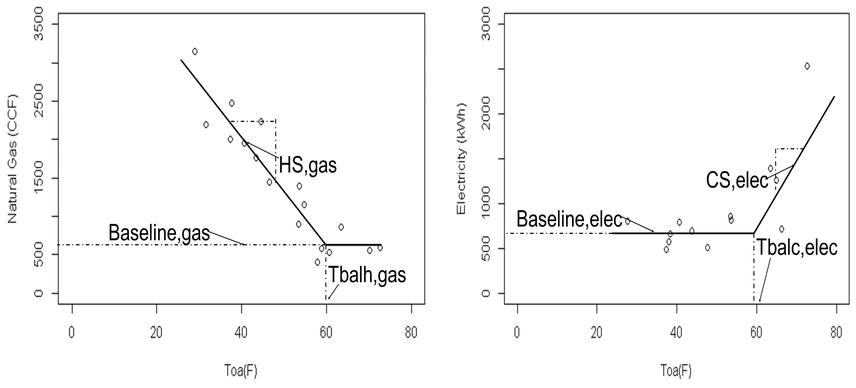
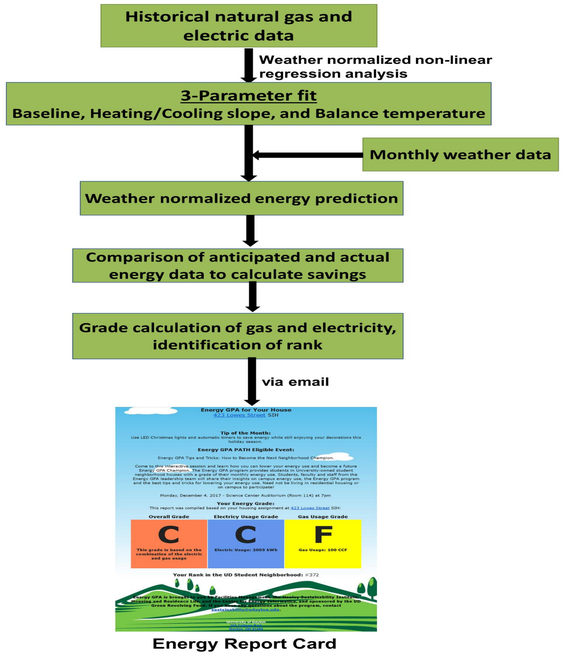


Figure: 3-P natural gas and 5-P electric fit of one the students residence



Results

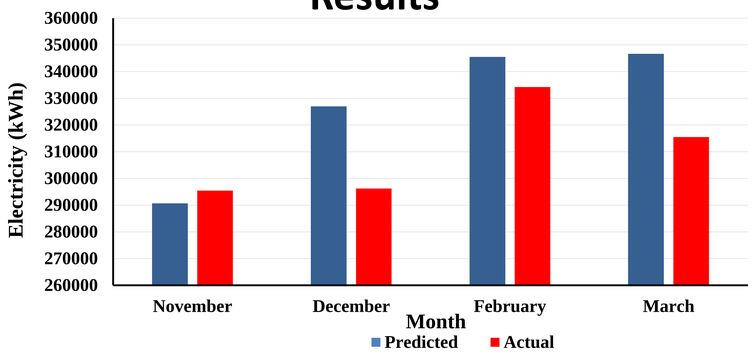


Figure: Comparison of monthly anticipated and actual electricity use

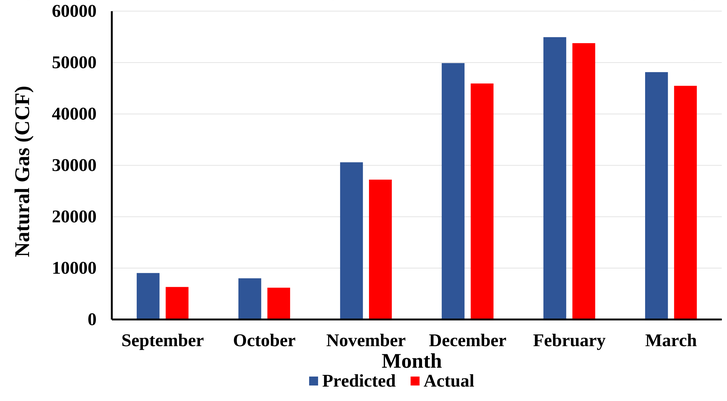


Figure: Comparison of monthly anticipated and actual natural gas use

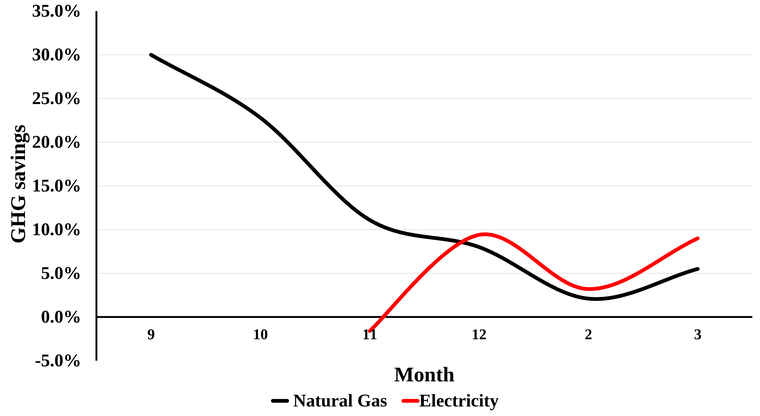


Figure: GHG saving for natural gas and electricity

Conclusions

- ✓ Behavior influenced energy and carbon reduction is nearly free as compared to investment in renewable technologies
- ✓ The study realized average energy saving of 7.8% for natural gas and 5.2% for electricity are especially impressive, given that students have no economic incentive to reduce energy
- ✓ It is interesting to think about extrapolation of theses savings to the population of the U.S. at large

Recommendations

- ✓ Further research is required to develop more accurate predictions
- ✓ Smart Wi-Fi thermostat data provide additional information which could be exploited to predict energy consumption
- ✓ Housing characteristics and building geometry could also be added to improve the ability to predict the monthly energy consumption

Acknowledgement

- ✓ Green Revolution Fund, University of Dayton
- ✓ Matthew Worsham, Sustainability and Energy Coordinator